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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/666,434

09/18/2003

Hung Liao

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8305

7590

05/19/2004

HEWLETT-PACKARD COMPANY
Intellectual Property Administration
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EXAMINER

LEE, HSIEN MING

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 05/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/666,434

Applicant(s)

LIAO ET AL.

Examiner

Hsien-Ming Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 3/8/04
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: “ 46” in Fig.1. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 8-13 and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Havemann et al. (US 5,059,546) in view of Takahashi et al. (US 6,207,976).

In re claims 8, 16, Havemann et al., in Figs. 1-8, 9-10 and related text, teach the claimed process for manufacturing a BiMOS microcircuit, comprising:

- forming a buried layer 12 of a first semiconductor material (i.e. n+ buried layer) (Fig.1);
- forming a gate oxide 36 for at least one MOS transistor (Fig.3);
- forming a polysilicon layer 48 on the gate oxide 36 (Fig.4);
- forming a base 44 of a second semiconductor material (i.e. p- base) (Fig.4);

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- forming a source 104 and a drain 106 for the MOS transistor of a third semiconductor material (i.e. p+ layer)(Fig.9); and
- forming an emitter 74 of a silicide on the base 44 (Fig.9).

Havemann et al. do not teach forming the emitter of a group III-VI semiconductor.

However, Takahashi et al. teach forming the emitter of a group III-VI semiconductor, wherein Takahashi et al. suggest using a compound material containing Ga as a group III element and S as a group VI element (col. 3, lines 45-49).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time of the invention was made, to form the emitter of group III-VI semiconductor, as taught by Takahashi et al. in the method of Havemann et al., since by this manner it would lower the density of surface states of the circuit and thus to electrically connect with an ohmic contact (col. 3, lines 50-55).

In re claim 9, Havemann et al also teach after forming the buried layer 12, isolating the buried layer 12 via the field oxide 26 and 32 into pockets.

In re claim 10, Havemann et al also teach forming a deep N+ collector 34 (col. 4, lines 6-7).

In re claim 11, Havemann et al also teach utilizing part of the buried layer 34 as a collector; and forming contacts 116, 114, 118, 122, 124 and 120 to the base 44, emitter 74, collector 34, source 104, drain 106 and polysilicon layer 48 on the gate oxide 36, respectively.

In re claim 12, Havemann et al also teach forming wells 12 and 14 of the second semiconductor material in the buried layer.

In re claim 13, Havemann et al. in view of also Takahashi et al. teach a BiMOS microcircuit produced by the process of claim 8.

In re claim 17, Havemann et al. in view of Takahashi et al. also teach a heterojunction bipolar transistor (i.e. NPN) manufacturing by the process of claim 16.

In re claim 18, Havemann et al. in view of Takahashi et al. also teach that group III/VI semiconductor is selected from GaS because Takahashi et al. teach using Ga as the group a group III element and S as a group VI element (col. 3, lines 45-49).

4. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. (US 6,207,976).

In re claim 14, Takahashi et al. teach the claimed method comprising coupling a group III/V semiconductor between the p-doped semiconductor substrate 10 and the electrical contact (i.e. an ohmic contact, col. 3, lines 54-55).

Although Takahashi et al. is silent as to the p-doped semiconductor substrate 10 being a Si semiconductor, one of the ordinary skill in the art, at time of the invention was made, would have been motivated to use Si as the material for the semiconductor substrate 10, since p-doped Si semiconductor substrate has been widely used in the art for an application of an electrical contact.

In re claim 15, Takahashi et al. teach that the group III/VI semiconductor is selected from GaS, as stated above.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-Ming Lee whose telephone number is 571-272-1863. The examiner can normally be reached on M-F (9:00 ~ 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hsien-Ming Lee
Primary Examiner
Art Unit 2823

May 17, 2004

A handwritten signature in dark ink, appearing to read "Hsien-Ming Lee", with a long horizontal flourish extending to the right.